

State of California  
The Resources Agency  
Department of Fish and Game

**RECOVERY STRATEGY FOR  
CALIFORNIA COHO SALMON**  
Report to the California Fish and  
Game Commission

Prepared by  
The California Department of Fish and Game

**Species Recovery Plan Report 2003-1**

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# References Cited

- Allendorf, F.W. and F.M. Utter. 1979. Population genetics. In Fish physiology, W.J. Hoar, D.J. Randall, and J.R. Brett, eds. Vol. 8. New York: Academic Press.
- Ambrose, J. and D. Hines. 1997. Ten Mile River watershed 1996 instream monitoring results. Georgia-Pacific West, Inc.
- Ambrose, J. and D. Hines. 1998. Ten Mile River watershed 1997 instream monitoring results. Georgia-Pacific West, Inc., The Timber Company.
- Ambrose, J., D. Hines, D. Lundby, and J. Drew. 1996. Ten Mile River watershed 1995 instream monitoring results. Georgia-Pacific West, Inc.
- Anderson, K. R. 1995. *A status review of the coho salmon (Oncorhynchus kisutch) in California south of San Francisco Bay*. Report to the California Fish and Game Commission. CDFG.
- Armour, C. L., D. A. Duff, and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. *Fisheries* 16: 7–11.
- Baker, P., and F. Reynolds. 1986. *Life history, habitat requirements, and status of coho salmon in California*. Report to the California Fish and Game Commission. CDFG.
- Banks, M., J. Robertson, K. Bucklin, P. Siri, and D. Hedgecock. 1999. *Population genetics criteria for restoration of coho salmon (Oncorhynchus kisutch) in northern California*. Sonoma County Water Agency.
- Bartley, D.M., B. Bentley, P.G. Olin, and G.A.E. Gall. 1992. Population structure of coho salmon (*Oncorhynchus kisutch*) in California. *California Fish and Game* 78(3): 88–104.
- Beacham, T. D., and C. B. Murray. 1990. Temperature, egg size, and development of embryos and alevins of five species of Pacific salmon: a comparative analysis. *Transactions of the American Fisheries Society* 119: 927–945.
- Beamish, R.J., B.L. Thomson, and G.A. McFarlane. 1992. Spiny dogfish predation on Chinook and coho salmon and the potential effects on hatchery-produced salmon. *Transactions of the American Fisheries Society* 121: 444–455.

- Behnke, R. J., and M. Zarn. 1976. *Biology and management of threatened and endangered western trouts*. U.S. Department of Agriculture, Forest Service, General Technical Report RM-28.
- Bell, E. 2001. Low growth rates and possible life-history consequences for juvenile coho salmon. Abstract of presentation given at the American Fisheries Society, California-Nevada and Humboldt Chapters 35<sup>th</sup> Annual Meeting. March 29–31, 2001. Santa Rosa, California.
- Bell, M. C. 1986. *Fisheries handbook of engineering requirements and biological criteria*. U.S. Army Corps of Engineers, Office of the Chief of Engineers, Fish Passage Development and Evaluation Program, Portland, Oregon.
- Belt, T. Captain, Central Coast Region, CDFG. A compilation of information from coastal and regional wardens within the petitioned area. E-mail, December 7, 2001. USE FIRST NAME?
- Berggren, T.J., and M. Filardo. 1993. An analysis of variables influencing the migration of juvenile salmonids in the Columbia River Basin. *North American Journal of Fisheries Management* 13: 48–63.
- Bilby, R. E. 1984. Characteristics and frequency of cool-water areas in a western Washington stream. *Journal of Freshwater Ecology* 2: 593–602.
- Bisson, P. A., R. A. Bilby, M. D. Bryant, C. A. Dolloff, G. B. Grette, R. A. House, M. L. Murphey, K. V. Koski, and J. R. Sedell. 1987. Large woody debris in forested streams in the Pacific northwest: past, present and future. In *Streamside management: forestry and fishery interactions*, Salo and Cundy, eds. 143–190. College of Forest Resources, Contribution 57. University of Washington.
- Bjornn T. C., and D. W. Reiser. 1991. Habitat requirements of salmonids in streams. In *Influences of forest and rangeland management on salmonid fishes and their habitats*, Meehan, W. R. 1991. American Fisheries Society Special Publication 19: 83–138.
- Blann, K. 2000. Adaptive Management Practitioner's Network. A compilation of adaptive management definitions by scientists and managers in forum titled "Taking Stock: Implementing Adaptive Management in Large River Systems." <http://www.adaptivemanagement.net>
- Booth, D. B. 1991. Urbanization and the natural drainage system—impacts, solutions, and prognoses. *Northwest Journal of Environmental Law and Policy* 7: 93–118.
- Botkin, D., K. Cummins, T. Dunne, H. Reiger, M. Sobel, L. Talbot, and L. Simpson. 1995. *Status and future of salmon in western Oregon and northern California: findings and options*. The Center for the Study of the Environment. Report No. 8. May, 1995.

- Botkin, D.B., D.L. Peterson, and J.M. Calhoun, technical editors. 2000. The scientific basis for validation monitoring of salmon for conservation and restoration plans. Olympic Natural Resources Technical Report. University of Washington. 82 pages.
- Bovee, K. D. 1978. *Probability-of-use criteria for the family Salmonidae*. U.S. Department of the Interior, Fish and Wildlife Service FWS/OBS-78-07.
- Brett, J. R. and D. MacKinnon. 1954. Some aspects of olfactory perception in migrating adult coho and spring salmon. *Journal of the Fisheries Research Board Canada* 11: 310-318.
- Briggs, J.C. 1953. *The behavior and reproduction of salmonid fishes in small coastal streams*. CDFG Bulletin No. 94.
- Brown, D.J.A., and K. Sadler. 1989. Fish survival in acid waters. In *Acid toxicity and aquatic animals*, R. Morris, E.W. Taylor, D.J.A. Brown, and J.A. Brown, eds. Cambridge, England: Cambridge University Press.
- Brown, L.R., and P.B. Moyle. 1991. *Status of coho salmon in California*. Report to the National Marine Fisheries Service, Department of Wildlife and Fisheries Biology, University of California at Davis.
- Brown, L.R., P.B. Moyle, and R. M. Yoshiyama. 1994. Historical decline and current status of coho salmon in California. *North American Journal of Fisheries Management*. 14(2): 237–261.
- Brown, R.A. 1988. Physical rearing habitat for anadromous salmonids in the Redwood Creek Basin, Humboldt County, California. M.S. Thesis, Humboldt State University, Arcata, CA.
- Brown, R.F. and B.R. Mate. 1983. *Abundance, movements and feeding habits of harbor seals (Phoca vitulina) at Netarts and Tillamook bays, Oregon*. NOAA Fishery Bulletin 81(2): 291–301.
- Busack, C.A., and K.P. Currens. 1995. Genetic risks and hazards in hatchery operations: fundamental concepts and issues. *Am. Fish. Soc. Symp.* 15:71-80.
- CACSST (California Advisory Committee on Salmon and Steelhead Trout). 1988. *Restoring the balance*. Annual Report No.124-J.
- CALFED Bay Delta Program. July 2000. Comprehensive Monitoring, Assessment, and Research Program. Final Programmatic EIS/EIR Technical Appendix. 164 pages.
- Campton, D.E. 1995. *Genetic effects of hatchery fish on wild populations of Pacific salmon and steelhead: What do we really know?* Symposium of the American Fisheries Society 15: 337–353.
- Cavalli-Sforza, L.L., and A.W.F. Edwards. 1967. Phylogenetic analysis: models and estimation procedures. *Evolution* 21:550-570.

- CDFG (California Department of Fish and Game). 1991. *Lower Yuba River fisheries management plan*. Stream Evaluation Report No. 91-1.
- CDFG (California Department of Fish and Game). 1994. *Petition to the Board of Forestry to list coho salmon (Oncorhynchus kisutch) as a sensitive species*.
- CDFG (California Department of Fish and Game). 1998. *Report to the Fish and Game Commission: a status review of the spring-run Chinook salmon (Oncorhynchus tshawytscha) in the Sacramento River drainage*. CDFG Candidate Species Status Report 98-01.
- CDFG (California Department of Fish and Game). 2001. *Draft Russian River basin plan, central coast region*. 2001.
- CDFG (California Department of Fish and Game). 2002. *Status review of California coho salmon north of San Francisco*. Report to The California Fish and Game Commission, April 2002.
- Cederholm, C.J., L. M. Reid, and E. O. Salo. 1981. *Cumulative effects of logging road sediment on salmonid populations in the Clearwater River, Jefferson County, Washington*. State of Washington Water Research Center. Washington State University, Pullman.
- Cederholm, C.J., and L.M. Reid. 1987. Impact of forest management on coho salmon (*Oncorhynchus kisutch*) populations of the Clearwater River, Washington: a project summary. In *Streamside management: forestry and fishery interactions*, E.O. Salo and T.W. Cundy, eds. Institute of Forest Resources, Contributions No. 57, University of Washington, Seattle. pp. 373–398
- Chapman, D., A. Giorgi, T. Hillman, D. Deppert, M. Erho, S. Hays, C. Peven, B. Suzumoto, and R. Klinge. 1994. *Status of summer/fall chinook salmon in the mid-Columbia region*. Report for Chelan, Douglas, and Grant county public utility districts.
- Cole, J. 2000. Coastal sea surface temperature and coho salmon production off the north-west United States. *Fisheries Oceanography* 9(1): 1-16.
- Collins, B., and T. Dunne. 1990. *Fluvial geomorphology and river-gravel mining: a guide for planners, case studies included*. Department of Conservation, Division of Mines and Geology, Special Publication No. 98.
- Cooper, A.B., and M. Mangel. 1999. *The dangers of ignoring metapopulation structure for the conservation of salmonids*. U.S. Bureau of Fisheries Bulletin No. 97: 213–226.
- Cooper, A, C. 1959. Discussion of the effects of silt on survival of salmon eggs and larvae. *Proceedings of the fifth symposium (Pacific Northwest) on siltation: its source and effects on aquatic environment*. U.S. Department of Health, Education and Welfare, Portland, Oregon.

- Cooper, R., and T. H. Johnson. 1992. *Trends in steelhead (Oncorhynchus mykiss) abundance in Washington and along the Pacific coast of North America*. Washington Department of Wildlife, Fisheries Management Division, Report No. 92-20.
- Cox, William. Senior Fish Pathologist, Fish Health Laboratory, California Department of Fish and Game, personal communication (as taken from the *Status Review of California Coho Salmon North of San Francisco*), Sept. 10, 2001.
- Cramer, S.P., S.W. Alley, J.E. Baldrige, K. Barnard, D.B. Demko, D.H. Dettman, B. Farrell, J. Hagar, T.P. Keegan, A. Laird, W.T. Mitchell, R.C. Nuzum, R. Orton, J.J. Smith, T.L. Taylor, P.A. Unger, and E.S. Van Dyke. 1995. *The status of steelhead populations in California in regards to the Endangered Species Act*. S.P. Cramer and Associates, Inc., Gresham, Oregon.
- Currens, K.P., and C.A. Busack. 1995. A framework for assessing genetic vulnerability. *Fisheries* 20(1):24-31.
- Davidson, F. A., and S. J. Hutchinson. 1938. *The geographic and environmental limitations of the Pacific salmon* (Genus *Oncorhynchus*). U.S. Bureau of Fisheries Bulletin No. 48: 667–692.
- Davis, G. E., J. Foster, C. E. Warren, and P. Doudoroff. 1963. The influence of oxygen concentration on the swimming performance of juvenile Pacific salmon at various temperatures. *Transactions of the American Fisheries Society* 92: 111–124.
- Dorn, M. W. 1989. A conditional logistic regression model for the onset of riverine salmon migrations. M.S. thesis, University of Washington, Seattle.
- Downie, S.T., C.W. Davenport, E. Dudik, F. Yee, and J. Clements. 2002. Mattole River Watershed Assessment Report. North Coast Watershed Assessment Program. California Resources Agency, and California Environmental Protection Agency, Sacramento, California.
- Ebel, W. J., and H. L. Raymond. 1976. Effect of atmospheric gas supersaturation on salmon and steelhead trout of the Snake and Columbia rivers. *Marine Fisheries Review* 38: 1–14.
- Ellis, D.V. 1962. Preliminary studies on the visible migrations of adult salmon. *Journal of the Fisheries Research Board Canada* 19: 137–148.
- Emmett, R. L., and M. H. Schiewe, eds. 1997. *Estuarine and ocean survival of northeastern Pacific salmon: proceedings of the workshop*. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-NEFSC-29.
- Essig, D.A. 1998. *The dilemma of applying uniform temperature criteria in a diverse environment: an issue analysis*. Idaho Division of Environmental Quality, Water Quality Assessment and Standards Bureau.

- Everest, F. H., N. B. Armantrout, S. M. Keller, W. D. Parante, J. R. Sedell, T. E. Nickelson, J. M. Johnston, and G. N. Haugen. 1985. Salmonids. In *Management of wildlife and fish habitats in forests of western Oregon and Washington*, E. R. Brown, ed. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, Oregon. Publication R6-F&WL-192-1985
- Federal Register. 1996. Final Rule. Endangered and threatened species: Threatened status for Central California Coast coho salmon evolutionarily significant unit (ESU), October 31, 1996. 61(212): 56138-56149.
- Federal Register. 1997. Final Rule. Endangered and threatened species: Threatened status for Southern Oregon/ Northern California Coast evolutionarily significant unit (ESU) of coho salmon, May 5, 1997. 62(87): 24588-24609.
- FEMAT (Forest Ecosystem Management Assessment Team). 1993. *Forest ecosystem management: an ecological, economic, and social assessment* (report). U.S.: Bureau of Land Management, Environmental Protection Agency, National Marine Fisheries Service, National Park Service, Fish and Wildlife Service and Forest Service.
- Flagg, T.A., B.A. Berejikian, J.E. Colt, W.W. Dickhoff, L.W. Harrell, D.J. Maynard, C.E. Nash, M.S. Strom, R.N. Iwamoto, and C.V. Mahnken. 2000. *Ecological and behavioral impacts of artificial production strategies on the abundance of wild salmon populations*. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-XX.
- Fleming, I.A., and M.R. Gross. 1993. Breeding success of hatchery and wild coho salmon (*Oncorhynchus kisutch*) in competition. *Ecological Applications* 3: 230–245.
- Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey, and B. Collins. 1998. *California salmonid stream habitat restoration manual*, 3<sup>rd</sup> edition. CDFG.
- Ford, M.J., P.J. Thornton, and L.K. Park. 1999. Natural selection promotes divergence of transferrin among salmonid species. *Molecular Ecology* 8: 1055–1061.
- Frankham, R., K. Lees, M. E. Montgomery, P.R. England, E.H. Lowe, and D. A. Briscoe. 1999. Do population size bottlenecks reduce evolutionary potential? *Animal Conservation* 2:255-260.
- Franklin, J.R. 1980. Evolutionary changes in small populations. Pp. 135-149, In: M. Soule (ed.) *Conservation Biology: and evolutionary-ecological perspective*. Sinauer Associates, Sunderland, MA.
- Fry, D. 1973. *Anadromous fishes of California*. CDFG.
- Goley, D. and A. Gemmer. 2000. Pinniped / salmonid interactions on the Smith, Mad and Eel rivers in northern California between 31 August and 15

December 1999. Unpublished report, Humboldt State University Marine Mammal Education and Research Program, Arcata, California.

- Grant, S. (editor). 1997. *Genetic effects of straying of non-native hatchery fish into natural populations*. U.S. Dept. of Commer., NOAA Tech. Memo, NMFS-NWFSC-30, Seattle, WA.
- Graybill, M.R. 1981. Haul-out patterns and diet of harbor seals, *Phoca vitulina*, in Coos County, Oregon. M.S. thesis. University of Oregon.
- Gribanov, V.I. 1948. The coho salmon (*Oncorhynchus kisutch*): a biological sketch. *Izvestiya Tikhookeanskogo nauchno-issledovatel'skogo instituta rybnogo khoziastva okeanografii* 28: 43–101. Translated from the Russian. Fisheries Research Board of Canada Translation Service.
- Griffith, J. S., and D. A. Andrews. 1981. Effects of a small suction dredge on fishes and aquatic invertebrates in Idaho streams. *North American Journal of Fisheries Management* 1: 21–28. 38: 1444–1448.
- Groot, C. 1982. Modifications on a theme--a perspective on migratory behavior of Pacific salmon. In *Proceedings, salmon and trout migratory behavior symposium*, E. L. Brannon and E. O. Salo, eds., 1–21. College of Fisheries, University of Washington, Seattle.
- Halligan, D. 1997. *Final report on the results of the 1996 fisheries monitoring program on the Trinity and lower Mad, Eel, and Van Duzen Rivers*. Natural Resources Management Corporation, Eureka, California.
- Hallock, R. J. and D. H. Fry. 1967. Five species of salmon, *Oncorhynchus*, in the Sacramento River, California. *California Fish and Game*, 53(1): 5–22.
- Hanson, L.C. 1993. The foraging ecology of harbor seals, *Phoca vitulina*, and California sea lions, *Zalophus californianus*, at the mouth of the Russian River, California. Master's thesis, Sonoma State University, California.
- Harvey, B.C. 1986. Effects of suction gold dredging on fish and invertebrates in two California streams. *North American Journal of Fisheries Management* 6: 401–409.
- Hassler, T.J., C.M. Sullivan, and G.R. Stern. 1991. *Distribution of coho salmon in California*. Annual Report to CDFG.
- Hedgecock, D. 2001. Unpublished progress report memo to California Department of Fish and Game.
- Hedgecock, D, M. Banks, K. Bucklin, C. Dean, W. Eichert, C. Greig, P. Siri, P. Nyden, and J. Waters. 2002. Documenting biodiversity of coastal salmon (*Oncorhynchus* spp.) in Northern California. Final Report. Sonoma County Water Agency contract #TW-99/00-110. 61 p.
- Henly, R., S. Cannata, J. Erler, J. Sunahara, and J. Clements. 2002. Redwood Creek Watershed Assessment Report. North Coast Watershed Assessment



Program. California Resources Agency and California Environmental Protection Agency, Sacramento, California.

- Hillemeier, D. Fisheries Program Manager, Yurok tribe. E-mail, November 9, 2001.
- Hindar, K., N. Ryman, and F. Utter. 1991. Genetic effects of cultured fish on natural fish populations. *Canadian Journal of Fisheries and Aquatic Sciences* 48: 945–957.
- Hines, D. and J. Ambrose. ND. Evaluation of stream temperatures based on observations of juvenile coho salmon in northern California streams. Unpublished cooperative report. Campbell Timberland Management, Inc. and National Marine Fisheries Service.
- Holtby, L.B. 1988. Effects of logging on stream temperatures in Carnation Creek, British Columbia, and associated impacts on the coho salmon (*Oncorhynchus kisutch*). *Canadian Journal of Fisheries and Aquatic Sciences* 45: 502–515.
- Holtby, L. B., B. C. Andersen, and R. K. Kadowaki. 1990. Importance of smolt size and early ocean growth to interannual variability in marine survival of coho salmon (*Oncorhynchus kisutch*). *Canadian Journal of Fisheries and Aquatic Sciences* 47: 2181–2194.
- Hopkirk, J. D. 1973. *Endemism in fishes of the Clear Lake region of central California*. Berkeley and Los Angeles: University of California Press.
- Humboldt County Public Works. 1992. *Final program EIR on gravel removal from the lower Eel River*. Natural Resources Division.
- Jager, D., 1994. *Program environmental impact report on gravel removal from the lower Eel and Van Duzen rivers*. Prepared for the County of Humboldt, Eureka, California.
- Jameson, R.J. and K.W. Kenyon. 1977. Prey of sea lions in the Rogue River, Oregon. *Journal of Mammalogy* 58(4): 672.
- Johnson, S.L. 1988. The effects of the 1983 El Niño on Oregon's coho, *Oncorhynchus kisutch*, and Chinook, *O. tshawytscha*, salmon. *Fisheries Research* 1988. 6(2): 105–123.
- Knutson, K. L. and V. L. Naef. 1997. *Management recommendations for Washington's priority habitats*. Washington Department of Fish and Wildlife, Olympia.
- Kondolf, G.M. 1993. The reclamation concept in regulation of gravel mining in California. *Journal of Environmental Planning and Management* 36: 395–406.
- Koslow, J.A., A.J. Hobday, and G.W. Boehlert. 2002. Climate variability and marine survival of coho salmon (*Oncorhynchus kisutch*) in the Oregon production area. *Fisheries Oceanography* 11(2): 65-77.

- Lande, R. 1995. Mutation and conservation. *Conservation Biology* 9:782-791.
- Lande, R., and G.F. Barrowclough. 1987. Effective population size, genetic variation and their use in population management. Pp 87-124, *In*: M. Soule (ed.) *Conservation Biology: An evolutionary-ecological perspective*. Sinauer Associates, Sunderland, MA.
- Laufle, J. C., G. B. Pauley, and M. F. Shepard. 1986. *Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest): Coho salmon*. U.S. Fish and Wildlife Service Biological Report No. 82(11.48). U.S. Army Corps of Engineers, TR EL-82-4.
- Larsson, P. O. 1985. Predation on migrating smolt as a regulating factor of Baltic salmon, *Salmo salar* L., populations. *Journal of Fish Biology* 26: 391–397.
- Lawson, P. W. 1993. Cycles in ocean productivity, trends in habitat quality, and the restoration of salmon runs in Oregon. *Fisheries* 18(8): 6–10.
- Leider, S.A., P.L. Hulett, J.J. Loch, and M.W. Chilcote. 1990. Electrophoretic comparison of the reproductive success of naturally spawning transplanted and wild steelhead trout through the returning adult stage. *Aquaculture* 88: 239–252.
- Leidy, R. and G. Becker. 2001. Letter to Dennis McEwan, California Department of Fish and Game.
- Leitritz, E. and R.C. Lewis. 1980. *Trout and salmon culture*. CDFG Bulletin No.164.
- Levin, P.S. and M.H. Schiewe. 2001. Preserving salmon biodiversity. *American Scientist* 89(3): 220–227.
- Levins, R. 1969. Some demographic and genetic consequences of environmental heterogeneity for biological control. *Bulletin of the Entomological Society of America* 15: 237–240. CHECK PERIODICAL TITLE
- Li, H. W., M. Dutchuk, C. B. Schreck. 1979. Unpublished data, available from the senior author, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon.
- Lloyd, D. S., J. P. Koenings, and J. D. LaPerriere. 1987. Effects of turbidity in fresh waters of Alaska. *North American Journal of Fisheries Management* 7: 18–33.
- Lucoff, W. 1980. The distribution of six selected species from the genera *Oncorhynchus*, *Salmo*, and *Salvelinus* in California. M.S. thesis, California State University, Hayward.
- Lynch, M. 1990. Mutation load and the survival of small populations. *Evolution* 44:1725-1737.

- Mantua, N.J., 2003. The Pacific decadal oscillation and climate forecasting for North America.  
[http://www.atmos.washington.edu/~mantua/REPORTS/PDO/PDO\\_cs.htm](http://www.atmos.washington.edu/~mantua/REPORTS/PDO/PDO_cs.htm)
- Mantua, N.J., S.R. Hare, Y. Zhang, J.M. Wallace, and R.C. Francis. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. *Bull. Amer. Meteorological Soc.* 78:1069-1079.
- McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. *Viable salmonid populations and the recovery of evolutionarily significant units*. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-42.
- McHenry, M. L., D. C. Morrill, and E. Currence. 1994. *Spawning gravel quality, watershed characteristics and early life history survival of coho salmon and steelhead in five North Olympic Peninsula watersheds*. A study funded by the Department of Ecology, Centennial Clean Water Fund & Section 205J Clean Water Act. Prepared by the Lower Elwha S'Kallan Tribe and the Makah Tribe, Port Angeles and Neah Bay, Washington.
- Meehan, W.R., ed. 1991. *Influences of forest and rangeland management on salmonid fishes and their habitats*. American Fisheries Society Special Publication No. 19.
- Meffe, G.K. 1992. Techno-arrogance and halfway technologies—Salmon hatcheries on the Pacific coast of North America. *Conservation Biology* 6: 350–354.
- Merenlender, A. M., C. N. Brooks, and G. A. Giusti. 2000. Policy analysis related to the conversion of native habitat to vineyard: Sonoma County's vineyard erosion and sediment control ordinance as a case study. University of California, Berkeley. Integrated Hardwood Range Management Program. Electronic document: [http://danr.ucop.edu/ihrmp/policy\\_paper.pdf](http://danr.ucop.edu/ihrmp/policy_paper.pdf)
- Milner, G. B. 1993. Isozyme variation of coho salmon (*Oncorhynchus kisutch*) and its potential to estimate stock compositions of mixed stock fisheries. In *Proceedings of the coho workshop, Nanaimo, B.C., May 26-28*, Berg and P.W. Delany eds., 182–192. Available from Canadian Department of Fisheries and Oceans, Vancouver.
- Monan, G. E., J. H. Johnson, and G. F. Esterberg. 1975. Electronic tags and related tracking techniques aid in study of migrating salmon and steelhead trout in the Columbia River basin. *Marine Fisheries Review* 37: 9–15.
- Monschke, J. 1996. *Overview of stream channel conditions, North Fork Garcia River*. A report submitted for Coastal Forestlands, Ltd.
- Moring, J.R., G.C. Garman, and D.M. Mullen. 1994. Effects of logging practices on fishes in streams and techniques for protection: a review of four studies in the United States. In *Rehabilitation of Freshwater Fishes*, I.G. Cowx, ed. Hull International Fisheries Institute, University of Hull, U.K.

- Mortensen, D. G., B. P. Snyder, and E. O. Salo. 1976. *An analysis of the literature on the effects of dredging on juvenile salmonids*. Special report to the Department of Navy, College of Fisheries, Fisheries Research Institute, University of Washington, Seattle.
- Moyle, P.B. 1976. *Inland fishes of California*. Berkeley: University of California Press.
- Moyle, P.B., R. M. Yoshiyama, J. E. Williams, E. D. Wikramanayake. 1995. *Fish species of special concern in California*, second edition. CDFG.
- Murphy, M.L. 1995. *Forestry impacts on freshwater habitat of anadromous salmonids in the Pacific Northwest and Alaska: requirements for protection and restoration*. NOAA Coastal Ocean Program, Decision Analysis Series No. 7.
- Naiman, R.J., T.J. Beechie, L.E. Benda, D.R. Berg, P.A. Bisson, L.H. MacDonald, M.D. O'Connor, P.L. Olson, and E.A. Steel. 1992. Fundamental elements of ecologically healthy watersheds in the Pacific Northwest coastal ecoregion. In *Watershed management: balancing sustainability and environmental change*, R.J. Naiman, ed., pages 127–188. New York: Springer-Verlag.
- National Council on Gene Resources. 1982. *Anadromous salmonid genetic resources: and assessment plan for California*. California Gene Resources Program, Berkeley.
- Neave, F. 1943. Diurnal fluctuations in the upstream migration of coho and spring salmon. *Journal of the Fisheries Research Board Canada* 6: 158–163.
- Nei, M. 1987. Genetic distance and molecular phylogeny. In *Population genetics and fishery management*, N. Ryman ed., p.193–215. Seattle: University of Washington Press.
- Nielsen, J.L., T.E. Lisle, and V. Ozaki. 1994. Thermally stratified pools and their use by steelhead in northern California streams. *Transactions of the American Fisheries Society* 123: 613–626
- NMFS (National Marine Fisheries Service). 1996. *National gravel extraction policy*. Santa Rosa, California. (<http://swr.ucsd.edu/hcd/gravelsw.htm>).
- NMFS (National Marine Fisheries Service). 1998. *Factors contributing to the decline of Chinook salmon: an addendum to the 1996 west coast steelhead factors for decline report*. Protected Resources Division, NMFS, Portland, Oregon.
- NMFS (National Marine Fisheries Service). 2001. *Status review update for coho salmon (Oncorhynchus kisutch) from the central California coast and the California portion of the southern Oregon/northern California coasts Evolutionary Significant Units*. Southwest Fisheries Science Center, Santa Cruz Laboratory.

- NRC (National Research Council). 1996. *Upstream: salmon and society in the Pacific Northwest*, Washington, D.C.: National Academy Press.
- O'Brien, S. and J. Everman. 1989. Interactive influence of infectious disease and genetic diversity in natural populations. *Trends in Ecology and Evolution* 3:254-259.
- Olin, P.G. 1984. Genetic variability in hatchery and wild populations of coho salmon, *Oncorhynchus kisutch*, in Oregon. M.S. thesis, University of California, Davis.
- Pacific Coast Fish and Wildlife Wetlands Restoration Association. 2001. Stream surveys.
- Parrish, R.R., and M.J. Tegner. 2001. California's variable ocean environment. In *California's living marine resources: a status report*, Leet, W.S., C.M. Dewees, R. Klingbeil, and E.J. Larsen, eds., p. 21–28. The Resources Agency, CDFG.
- Pert, H. A. 1993. Winter food habits of coastal juvenile steelhead and coho salmon in Pudding Creek, northern California. M.S. thesis, University of California, Berkeley.
- PFMC (Pacific Fishery Management Council). 1999. *Identification and description of essential fish habitat, adverse impacts, and recommended conservation measures for salmon. Amendment 14 to the Pacific Coast salmon plan*.
- Phillips, R.W., and H.J. Campbell. 1961. The embryonic survival of coho salmon and steelhead trout as influenced by some environmental conditions in gravel beds. In *14th annual report of the Pacific Marine Fisheries Commission*, 60–73. Portland, Oregon.
- Pulliam, H.R. 1988. Sources, sinks, and population regulation. *American Naturalist* 132: 652–661.
- Quinn, T.P., and K. Fresh. 1984. Homing and straying in Chinook salmon *Oncorhynchus tshawytscha* from Cowlitz River Hatchery, Washington. *Canadian Journal of Fisheries and Aquatic Sciences* 41: 1078–1082.
- Reid, L. M. 1998. Forest roads, chronic turbidity, and salmon. EOS, *Transactions, American Geophysical Union* 79(45): F285
- Reisenbichler, R.R. and S.P. Rubin. 1999. Genetic changes from artificial propagation of Pacific salmon affect the productivity and viability of supplemented populations. *ICES Journal of Marine Science* 56: 459–466.
- Reiser, D.W. and T.C. Bjornn. 1979. Habitat requirements of anadromous salmonids. In *Influence of forest and rangeland management on anadromous fish habitat in western North America*, W.R. Meehan, ed. Pacific Northwest

Forest and Range Experiment Station, U.S. Forest Service. GTR-PNW-96.

- Reynolds, F. L., T. J. Mills, R. Benthin, and A. Low. 1993. *Restoring Central Valley streams: a plan for action*.
- Rich, A.A. 1991. *The impacts of timber harvest practices on the fishery resources of the Navarro River watershed, Mendocino County, California. Phase III: Fishery resources and baseline surveys*. Annual Report. Prepared for Louisiana-Pacific, Samoa, California.
- Ricker, W.E. 1972. Heredity and environmental factors affecting certain salmonid populations. In *The stock concept in Pacific salmon*, R.C. Simon and P.A. Larkin, eds. Vancouver: University of British Columbia.
- Roffe, T.J. and B.R. Mate. 1984. Abundance and feeding habits of pinnipeds in the Rogue River, Oregon. *Journal of Wildlife Management* 48(4): 1262–1274.
- Ryding, K.E. and J.R. Skalski. 1999. Multivariate regression relationships between ocean conditions and early marine survival of coho salmon (*Oncorhynchus kisutch*). *Can. J. Fisheries and Aquatic Sci.* 56(12): 2374–2384.
- Saccheri, I., M. Kuussaari, M. Kankare, P. Vikman, W. Fortelius, and I. Hanski. 1998. Inbreeding and extinction in a butterfly metapopulation. *Nature* 392:491–494.
- Salo, E.O. and T. W. Cundy, editors. 1987. *Streamside management: forestry and fishery interactions*. Contribution No. 57. Institute of Forest Resources, University of Washington, Seattle, Washington.
- Sandercock, F.K. 1991. Life history of coho salmon, *Oncorhynchus kisutch*. In *Pacific salmon life histories*, C. Groot and L. Margolis eds. Vancouver: University of British Columbia Press.
- Scheffer, T.H., and C.C. Sperry. 1931. Food habits of the Pacific harbor seal, *Phoca vitulina richardsi*. *J. Mammal.* 12(3): 214–226.
- Schlosser, I.J. and P.L. Angermeier. 1995. Spatial variation in demographic processes of lotic fishes: conceptual models, empirical evidence, and implications for conservation. In *Evolution and the aquatic ecosystem: defining unique units in population conservation*, J.L. Nielsen, ed. Symposium of American Fisheries Society, Bethesda, Maryland.
- Scott, W.B. and E.J. Crossman. 1973. *Freshwater fishes of Canada*. Bulletin No.184, Fisheries Research Board of Canada, Ottawa. Pp. 158–164.
- SEC (Steiner Environmental Consulting). 1996. *A history of the salmonid decline in the Russian River*. Sonoma County Water Agency, California State Coastal Conservancy, Steiner Environmental Consulting.

- Sedell, J.R. and K.J. Luchessa. 1982. Using the historical record as an aid to salmonid habitat enhancement. In *acquisition and utilization of aquatic habitat inventory information*, N. B. Armantrout, ed. Symposium of American Fisheries Society, Bethesda, Maryland.
- Sedell, J.R., F.H. Leone, and W. S. Duval. 1991. *Water transportation and storage of logs*. American Fisheries Society Special Publication No. 19: 325–368.
- Shapovalov, L. and A.C. Taft. 1954. *The life histories of the steelhead rainbow trout (Salmo gairdneri) and silver salmon (Oncorhynchus kisutch) with special reference to Waddell Creek, California, and recommendations regarding their management*. CDFG Bulletin No. 98.
- Shirazi, M.A. and W.K. Seim. 1981. Stream system evaluation with emphasis on spawning habitat for salmonids. *Water Resources Research* 17: 592–594.
- Snyder, J.O. 1931. *Salmon of the Klamath River, California*. CDFG Bulletin No. 34.
- Solazzi, M.G. 1986. Electrophoretic stock characterization of coho salmon populations in Oregon and Washington, and coastal Chinook salmon populations in Oregon. Oregon Department of Fish and Wildlife Information Report, 86-5, 16 p.
- Sorenson, D.L., M.M. McCarthy, E.J. Middlebrooks, and D.B. Porcella. 1977. *Suspended and dissolved solids effects on freshwater biota*. U.S. Environmental Protection Agency, Corvallis, Oregon.
- Sparkman, M. 2000. Summary report on salmon & steelhead out migration, Upper Redwood Creek, Humboldt County, California. Douglas Parkinson and Associates. Arcata, CA.
- Sparkman, M. 2002. Annual Report Upper Redwood Creek juvenile salmonid downstream migration study, 2000-01. DFG, North Coast Region.
- Spence, B.C. 1995. Geographic variation in timing of fry emergence and smolt migration of coho salmon (*Oncorhynchus kisutch*). Ph.D diss. Oregon State University, Corvallis.
- Spence, B., G. Lomnický, R. Hughes, and R. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-401-96-6057. ManTech Environmental Research Services Corporation, Corvallis, Oregon.
- Steward, E.R. and T.C. Bjornn. 1990. *Supplementation of salmon and steelhead stocks with hatchery fish; a synthesis of published literature*. Bonneville Power Administration Project, Part 2, 88-100. Portland, Oregon.
- Tagart, J.V. 1984. Coho salmon survival from egg deposition to fry emergence. In *Proceedings of the Olympic Wild Fish Conference, March 23-25, 1983*, J.M. Walton and B. Houston, eds. Fisheries Technology Program, Peninsula College, Port Angeles, Washington.

- Taylor, B., L. Kremsater, and R. Ellis. 1997. *Adaptive Management of Forests in British Columbia*. British Columbia Ministry of Forests.
- Terrell, C.R., and P.B. Perfetti. 1989. *Water quality indicators guide: surface waters*. U.S. Soil Conservation Service. SCS-TP-161. Washington, D.C.
- Thomas, V.G. 1985. Experimentally determined impacts of a small, suction gold dredge on a Montana stream. *North American Journal of Fisheries Management* 5: 480–488.
- Thompson, K. 1972. Determining stream flows for fish life. In Proceedings, instream flow requirements workshop. Pacific Northwest River Basins Commission, Vancouver and Washington.
- Tschaplinski, P. J. 1999. The effects of forest harvesting, fishing, climate variation, and ocean conditions on salmonid populations of Carnation Creek, Vancouver Island, British Columbia. In *Sustainable fisheries management Pacific salmon*, E.E. Knudsen, C. R Steward, D. D. MacDonald, J. E. Williams, D. W. Reiser, eds. CRC Press LLC, Lewis Publishers.
- USDA Forest Service (U. S. Department of Agriculture, Forest Service). 1997. *Northwest Forest Plan: An Ecosystem Management Approach*. USDA Forest Service, Portland, Oregon.
- USFWS (U. S. Fish and Wildlife Service). 1979. *Klamath River fisheries investigations: progress, problems and prospects*. Annual Report, Arcata, California, November 21, 1979.
- USFWS. 1996. Endangered and threatened wildlife and plants; determination of threatened status for the California red-legged frog. Federal Register, May 23, 1996 (Volume 61, Number 101)
- Utter, F. 1998. Genetic problems of hatchery-reared progeny released into the wild, and how to deal with them. *Bull. Mar. Sci.* 62:623-640.
- Waples, R.S. 1991a. *Definition of “species” under the Endangered Species Act; application to Pacific salmon*. NOAA Technical Memorandum NMFS F/NWC-194.
- Waples, R.S. 1991b. Genetic interactions between hatchery and wild salmonids: lessons from the Pacific Northwest. *Canadian Journal of Fisheries and Aquatic Sciences* 48 (Suppl. 1): 124–133
- Waples, R.S., R.G. Gustafson, L.A. Weitkamp, J.M. Myers, O.W. Johnson, P.J. Busby, J.J. Hard, G.J. Bryant, F.W. Waknitz, K. Neely, D. Teel, W.S. Grant, G.A. Winans, S. Phelps, A. Marshall, and B.M. Baker. 2001. Characterizing diversity in salmon from the Pacific Northwest. *Journal of Fish Biology* 59 (Supplement A): 1–41.
- Warren, J.W. 1991. *Diseases of hatchery fish*, 6th edition. U. S. Fish and Wildlife Service, Pacific Region,.



- Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. *Status review of coho salmon from Washington, Oregon, and California*. U.S. Department of Commerce, NOAA Technical Memorandum.NMFS-NWFSC-24.
- Welsh, Jr., H.W., G.R. Hodgson, B.C. Harvey, and M.F. Roche. 2001. Distribution of juvenile coho salmon in relation to water temperature in tributaries of the Mattole River, California. *North American Journal of Fisheries Management* 21: 464–470.
- Williamson, K. and D. Hillemeier. 2001a. *An assessment of pinniped predation upon fall-run Chinook salmon in the Klamath River estuary, California*. Yurok Tribal Fisheries Program. 1998.
- Williamson, K. and D. Hillemeier. 2001b. *An assessment of pinniped predation upon fall-run Chinook salmon in the Klamath River estuary, California*. Yurok Tribal Fisheries Program. 1999.